05-07-01

PRECAST/PRESTRESSED FABRICATION QUALIFICATION AUDIT

NAME OF PRECAST PLANT:

DATE:

ADDRESS:

FACILITIES' AUTHORIZED QUALITY CONTROL REPRESENTATIVE(S):

_____

_____

_____

_____

CONTRACTOR'S QUALITY CONTROL MANAGER:

_____

_____

ORIGINAL OR FOLLOW-UP VISIT:

NAME(S) OF AUDITOR(S):

_____

NAME OF PRECAST PLANT: _____ ***DATE:*** ***00/00/00***

In order to pass an audit, all the requests and audit forms must be complete and in conformance with the Contract Plans and Special Provisions. The Contractor must answer "yes" to all audit questions and have written documentation to support the affirmative responses.

The passing of an audit performed by the Engineer shall consist of the Engineer's answer of "yes" to all questions, verification of the documentation to support the affirmative responses, and having all required submittals completed and in conformance with the Contract Documents.

The procedure for requesting another audit in the event of an audit failure is as specified in the Contract Special Provisions.

We the undersigned have read and understand the "Precast/Prestressed Fabrication Qualification Audit", the Contract Plans, Special Provisions, and Engineer's Estimate pertaining to this audit and are providing the following information.

_____

General Contractor **Date**

_____

General Contractor's Quality Control Manager **Date**

_____

Facility Authorized Representative **Date**

NAME OF PRECAST PLANT: _____ *DATE:* ***00/00/00***

A. QUALITY SYSTEM

	YES	NO	REMARKS
Quality System Manual			
1. Does a unique PCQCP exist for this facility?			
2. Does the PCQCP cover the minimum items listed in the Special Provisions?			
Documented Procedures			
3. Do quality control procedures verify and provide documentation for requirements listed in the Special Provisions?			
Personnel			
4. Are QC individuals in the plant certified as required by the Special Provisions?			
5. Does the facility have available the services of a civil engineer, currently registered in the State of California, to sign the working drawing submittals?			
6. Does the facility have a staff of Quality Control (QC) personnel who are separate from production staff?			
7. Does the facility have a Plant Quality Control Manager who is in charge of the QC personnel and reports directly to management?			
8. Does the facility have on file and available, certifications for all the inspection personnel?			
9. Were QC personnel available in the plant during this inspection as required in the Special Provisions?			
Working Drawings			
10. Are the working drawings in conformance with the Special			

Provisions?			
11. Do the approved working drawings show all materials to be utilized in the finished precast elements?			

B. PRODUCTION PRACTICES

	YES	NO	REMARKS
Storage of Chemicals, Hardware and Equipment			
1. Are forms stored in a manner that provides protection from dimensional, surface, or structural damage?			
2. Are chemicals and release agents stored per the manufacturer's recommendations, particularly with regard to temperature extremes?			
3. Is fabrication hardware stored to avoid distortion?			
4. Is steel stored on pallets, blocks, racks, or in containers?			
5. If outside fabricators supply hardware, are records provided to show conformance with Plans and Special Provisions?			
Casting Areas			
6. Is the casting area of the adequate size and supplied with necessary equipment in good operating condition to ensure proper placement, consolidation, and finishing of the concrete?			
Curing and Finishing Areas			
7. Is the facility capable of maintaining a minimum concrete temperature in conformance with the Special Provisions			
<u>Moist Curing</u>			

8. Is the curing area well drained?			
9. Is adequate enclosure provided to maintain the required relative humidity and temperature?			
Accelerated Curing			
10. Does the heat source and distribution system provide uniform and controlled heat?			
11. Is time and temperature monitored and documented during the curing process for conformance with the Special Provisions?			
Finished Product Storage			
12. Are storage areas clean, well drained and stabilized?			
13. Are storage racks designed to minimize warping, bowing, chipping, cracking, or discoloring of the product?			
14. Have plans and installation of the storage rack system been reviewed and stamped by a civil engineer, currently registered in the State of California, to verify safe load capacity?			
Welding			
15. Are welding operations in conformance with the Special Provisions?			
16. Do welders know and understand which WPS is to be used with each specific weld?			
Forms			
17. Does quality control verify that forms are constructed to the profiles, dimensions, and tolerances in conformance with the approved working drawings, Plans, and Special Provisions?			
18. Does quality control verify that forms are constructed to maintain dimensional stability during			

handling and repeated use?			
19. Is formwork constructed tight to prevent leakage and result in a structure with correct profiles, dimensions, and tolerances?			
20. Is formwork kept clean and maintained?			
21. Does quality control verify that connection hardware is installed in conformance with the approved working drawings, Plans and Special Provisions?			
Product Identification			
22. Are precast concrete units identification marked in conformance with the approved working drawings and Special Provisions?			
23. Do quality control records trace the precast unit by said identification markings?			
Surface Finishes			
24. Does quality control verify that the surfaces of precast concrete units are finished in conformance with the Special Provisions?			
25. Are repair procedures available to in conformance with the Special Provisions?			
26. Does quality control verify that repairs are performed in accordance with the Special Provisions?			

C. RAW MATERIALS AND ACCESSORIES

	YES	NO	REMARKS
Concrete Materials			
1. Has documentation been submitted to show conformance with the Special Provisions for			

the following: ▪ Coarse Aggregate Grading ▪ Fine Aggregate Grading ▪ Aggregate Grading ▪ Physical Property Requirements ▪ Cement ▪ Mineral Admixtures ▪ Chemical Admixtures ▪ Air entraining Admixtures ▪ Water Quality			
2. Does the coarse aggregate appear clean, saturated surface dried and generally composed of crushed particles?			
3. Is the fine aggregate kept uniformly moist?			
4. Has documentation been submitted to show compliance with the Special Provisions for verifying and documenting the type of cement being delivered?			
5. Has documentation been submitted to show compliance with the Special Provisions for verifying and documenting the type of fly ash being delivered?			
6. Has documentation been submitted to show compliance with the Special Provisions for verifying and documenting the type of chemical admixture being delivered?			
7. Are aggregate stockpiles kept separate with walls or ample spacing between piles and do they have a hard base with good drainage?			
8. Are there provisions to control the moisture content in the aggregates so that it is kept as uniform and stable?			
9. Is water quality in conformance			

with the Special Provisions?			
10. Is wash water reused? If so how is the water treated to be in conformance with the Special Provisions prior to secondary use?			
11. Are bin bottoms sloping 50 degrees from horizontal in all directions to the outlet with the corners of the bin properly rounded so that all material moves towards the outlet?			
12. Does the material drop vertically into the bin directly over the discharge opening permitting discharge of more generally uniform material?			
13. Is the aggregate weighed automatically and then carried to a mixer on conveyor belt or discharged through a collecting cone to the mixer?			
14. Is the cement and admixtures weighed separately from the aggregate and is the discharge controlled so that the cement is flowing while the aggregate is being delivered?			
15. Are the hopper gates, water and admixture valves, and cement and flyash gates functioning properly and completely stopping discharge?			
Reinforcement and Hardware			
16. Has documentation been submitted to show steel reinforcing bars are in conformance with the Special Provisions?			
17. Has documentation been submitted to show that welded wire reinforcement is in conformance with the Special			

Provisions?			
18. Has documentation such as mill certificates been submitted to show that strand materials are in conformance with the Special Provisions?			
19. Has documentation been submitted to show that anchorages for post-tensioning are in conformance with the Special Provisions?			
20. Has documentation been submitted to show that sheathing for bonded post-tensioned tendons are in conformance with the Special Provisions?			
21. Has documentation been submitted to show that bar reinforcement splices are in conformance with the Special Provisions?			
22. Has documentation been submitted that epoxy coating for bar reinforcement is in conformance with the Special Provisions?			
23. Has documentation been submitted to show that insulation for curing is in conformance with the Special Provisions?			

D. CONCRETE

	YES	**NO**	**REMARKS**
Proportioning			
1. Has the mix design been reviewed and sealed by a civil engineer, currently registered in the State of California?			
Batching			

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2. Has the Batch Plant been certified by Caltrans in conformance with the requirements for Batch Plant Inspection Criteria?			
3. Are weight indicating devices in full view and near enough to be read accurately by the operator while charging the hopper?			
4. Are exposed fulcrums, clevices, and similar working parts of scales clean?			
5. Are the scales calibrated and sealed within the past 6 months and when the plant was set up?			
6. Are means of control provided so that, as the quantity desired in the weigh hopper is approached, the material may be shut off with precision?			
7. Are adequate standard test weights available for checking the accuracy of the scales?			
8. Are the hopper gates, water and admixture valves, and cement and flyash gates functioning properly and completely stopping discharge?			
9. Are proportioning devices certified in conformance with the Special Provisions?			
10. Are scales zeroed between loads?			
11. Is compensation for free moisture in aggregates calculated and performed?			
12. Are batch quantities on load ticket are actual and not nominal?			
13. Are the revolutions for mixing and time for mixing monitored from the moment that water is			

added?			
14. Does the batch ticket contain the information in conformance with the Special Provisions?			
15. Has the device for measuring water been calibrated within the past 6 months and when the plant was set up?			
Mixing			
16. Are the mixer blades clean and in good condition?			
17. Has the Contractor performed testing to verify that the mixer is capable of combining the concrete in conformance with the Special Provisions?			
18. Is documentation provided to show that the time from start of concrete mixing to placement is in conformance with the Special Provisions?			
Consolidation Equipment			
19. Do trained personnel operate vibratory equipment?			
20. Is documentation provided to show that vibratory procedures are established at the beginning of each project?			
Curing Concrete			
21. Are measures taken to ensure that one portion of the element does not cure differently than another portion of the element?			
22. Is documentation provided to show that test cylinders are cured in conformance with the Special Provisions?			
23. Is documentation provided to show that curing is performed in conformance with the Special Provisions?			

24. Are moisture retention enclosures resistant to tearing and positively fastened in place to avoid displacement?			
Post-Tensioning Tendon Grout			
25. Is documentation provided to show that grout materials are in conformance with the Special Provisions?			
26. Is documentation provided to show that trial mixes have been performed and that grout is proportioned in conformance with the Special Provisions?			

E. REINFORCEMENT AND PRESTRESSING

	YES	NO	REMARKS
Reinforcing Steel			
1. Are reinforcing steel deliveries identified with a heat number and are mill certificates in conformance with the Special Provisions?			
2. Is reinforcing steel kept free of contamination and stored separately in a neat and orderly fashion, straight and free of kinks?			
3. Is equipment used for handling coated welded wire or reinforcing bar protected at contact areas and does the equipment lift to prevent sagging of the bundles?			
4. Is documentation provided to show that fabrication tolerances are in conformance with the Special Provisions?			
5. Is documentation provided to show that fabrication has been reviewed by quality control			

personnel to check that cut and bent to the correct size and shape using the size and grade in conformance with the Plans and Special Provisions?			
6. Are reinforcing bars bent in conformance with the Special Provisions?			
7. Is damage to galvanized or epoxy coated reinforcing steel repaired in conformance with the Special Provisions?			
8. Is documentation provided to show that quality control personnel have checked the quantity, size, placement, and spacing of all reinforcement for conformance with the approved working drawings, Plans and Special Provisions?			
9. Are spacers and anchors used to ensure that reinforcement does not shift during placement of concrete?			
10. Are supports made of materials in conformance with the Special Provisions?			
11. Is documentation provided to show that concrete cover and other critical dimensions are measured?			
Tensioning			
12. Is documentation provided to show that tensioning is performed within required tolerances and that tensioning operations conform to both quality control procedures and the Special Provisions?			
13. Do methods of measuring tensioning conform to the Special Provisions?			
14. Is documentation provided to show that tensioning equipment is			

calibrated as a system (the same system used during production tensioning operations? Is the jacking equipment identified?			
15. Is documentation provided to show that equipment calibrations are performed in conformance with the Special Provisions?			
Pretensioning			
1. Are prestressing steel reels and coiled tendons identified with tags listing the heat number that matches the mill certificate?			
2. Do trained and authorized personnel perform tensioning procedures?			
3. Do tensioning procedures include the following information: ▪ Operation and control of jacking equipment ▪ Operation and control of gauging system ▪ Tensioning to an initial force and marking strand in preparation for measuring elongation ▪ Tensioning to a given final force, measuring, and recording the corresponding elongation ▪ Checking for strand anchor seating ▪ De-tensioning and stripping procedures			
4. Are strands pulled and stored per manufacturer's recommendations and in conformance to the Special Provisions?			
5. Are strands positioned in conformance with the approved working drawings and Plans?			

F. QUALITY CONTROL

NAME OF PRECAST PLANT: _____ ***DATE:*** ***00/00/00***

	YES	NO	REMARKS
Inspection			
1. Is documentation provided to show the acceptance by quality control personnel of all materials and embeds prior to concrete placement?			
2. Is documentation provided to show the acceptance by quality control personnel of forms and new setup changes prior to concrete placement?			
3. Is documentation provided to show acceptance by quality control personnel of reinforcement and other cast-in items, particularly critical tolerance items?			
4. Is documentation provided of daily inspection reports of batching, mixing, conveying, placing, compacting, curing, and finishing of concrete?			
5. Is documentation provided of stripping procedures?			
6. Do daily inspection reports include general observations of the plant, weather, and other items affecting production?			
7. Do inspection reports show preparation of concrete specimens for testing and performance of concrete tests such as penetration, air content, and compressive strength?			
8. Do inspection reports show that the finish of concrete elements has been inspected for defects, cracking and other problems?			
9. Have problems been reported and have damaged products been recorded, marked, and re-inspected after repair?			

10. Does inspection documentation exist to show that finish products are checked against approved working drawings, project requirements, and plant standards?			
11. Is initial camber checked on at least 25% of each day's production within 72 hours after transfer of prestressed forces?			
12. Is a final inspection performed of completed products during loading to check for proper blocking, damage, stains, and other problems that may affect the quality of the product?			
Testing and Records			
13. Are there samples of all required testing forms, record forms and quality control check forms included in the quality control plan?			
14. Does documentation exist showing that production testing is being performed for aggregates, concrete strength, air content, penetration, unit weight, temperature of concrete, air temperature, welding, stud welding, and heat of hydration?			
15. Is the following information documented for pretensioning procedures: ▪ Required total force per strand ▪ Initial force ▪ Calculated theoretical and actual gauge pressure for each strand or each group of strands stressed in one operation ▪ Calculated theoretical and actual elongation for each different jacking force ▪ Any unanticipated problems			

encountered during tensioning.			
16. Is the following information documented for post-tensioning: ▪ The jacking force and actual net elongation of each tendon with allowance made for elastic shortening of the member ▪ Data on and date of grouting			
17. Are operating instructions, calibration curves, and national and industry standards for all testing equipment maintained on site kept on file on site?			